tion" leaves a very large field of determinate evolution entirely uncovered and unexplained, and there remains a *tertium quid* which requires further investigation. Determinate evolution in these non-plastic structures at present strikes me as part of the mechanical necessities of development, if I may so express it. That is, given a certain primitive form, there is only one route along which it can attain a certain end, provided the intervening stages are mechanically effective. It is some such law of mechanical necessity as this which out of the conical type of reptilian teeth has evolved first the triconodont type, the tritubercular, and finally the multitubercular, and from these main stages have arisen sub-stages which are repeated and independently acquired over and over again in different branches of the mammalian class. This is not an explanation, or a theory, it is a fact yet to be understood.

Organic Selection constitutes a distinct advance, and is, at least, a very useful working hypothesis, but it is by no means the conclusion of the whole matter, as Alfred Wallace maintains. We must persevere in our analysis of life processes as revealed in living organisms and in fossils with a perfectly open mind, perhaps for many decades, perhaps for another century, before we reach final conclusions in regard to the complex processes of evolution.

Columbia University.

THE GEOLOGICAL CONGRESS IN RUSSIA.

By CHARLES PALACHE.

The Seventh International Geological Congress assembled in St. Petersburg during the first week of September, 1897. The Congress was notable among the meetings of this organization for the large number in attendance. It will certainly be memorable, to such of its members as took part in them, for the extent and interest of the excursions planned in con-

nection with it and for the warm-hearted hospitality tendered them in every part of the broad empire which they visited.

The program of excursions, issued early in the year by the Committee of Organization, was carried out in all its essential details. Moscow was the starting point of the first excursion to the Urals preliminary to the Congress, and consequently it was that city which most of the excursionists made their first objective point on entering the country. We found wherever we crossed the border that our membership tickets made the passage through the Custom House easy, although they did not replace our passports which we had often to show. Our railroad passes too, were accepted without question, and the most courteous treatment greeted us on every hand.

At Moscow we found the Bureau of the Congress established in the halls of the University, and here and in the parlors of the Continental Hotel, frequent gatherings of the excursionists took place during the three days we were in the city. The excursions in the vicinity of Moscow were of moderate interest geologically, the greatest attaching to that which visited the richly fossiliferous middle Carboniferous beds of Miatchkowo on the bank of the Moskwa River. On the other hand, the city itself with its wholly oriental character in architecture, coloring and street life, offered more than enough attractions to occupy the time at our disposal, and there were doubtless few who did not regret leaving this, the centre and fountain-head of the Russian national life.

About one hundred and thirty-five persons took part in the Ural excursion, of whom nine were ladies. A special train of thirteen cars was our means of transport and place of abode for the first three weeks of the trip, while a restaurant train of box cars, provided with tables and chairs, preceded us and furnished forth our meals. If there were numerous discomforts associated with this style of living, one could not but remember that there was no precedent for or experience of such an excursion as ours in the remote regions which we visited, and criticism was disarmed by the conditions.

From day to day excursions of various kinds were made along or away from the general line of the railroad which was

our base of operations. A steamer trip from Samara, on the Volga—a walk along the railroad, fifteen miles from Acha to Miniar, giving a fine section of the Carboniferous and Devonain strata—a two day's wagon trip to the iron mines (limonite) of Bakal—a visit to the foundry at Simsk and its charming environs—such were a few of the earlier excursions which, besides showing interesting geological sections, gave us a good opportunity to become acquainted with the customs and mode of living of the people of the region. And at every mine and foundry, in many of the towns and even at the railway stations, we found the heartiest welcome awaiting us, great concourses of people who looked upon us with undisguised curiosity but evident good will, receptions by the local authorities, and numerous lunches and banquets of the most lavish description. It is difficult indeed, to express the feeling of growing wonder which all shared at the continuous ovation that greeted us on all sides as we made our progress through these mountainous regions, seemingly so little calculated to afford such entertainment as we found. Still, harsh as it may seem to criticise in such a case, it must be confessed that there was too large a share of our time devoted to social functions, and we might have seen many additional localities of geologic interest had we not been compelled by our kind hosts to arrange our movements in accordance with their too frequent hospitalities.

The guide book of the excursions was prepared in the form of separate pamphlets for various localities or regions, written by the men who were best acquainted in each and who were to be our leaders. The descriptions were generally good, though often lacking in details; the sections and illustrations were satisfactory, though the mine sections rarely corresponded with the visible exposures. The accompanying geological map of Russia, scale 1:6,300,000, reduced from the larger map published bythe Geological Committee in 1892,scale 1:2,520,000 served as a very convenient means of orientation.

In the region between Moscow and Oufa where our leader was Nikitin, we saw horizontal or slightly disturbed strata ranging from Cretaceous downward to middle Carboniferous.

At Oufa, at the foot of the Ural Mountains, we entered a zone of openly folded paleozoic rocks including the Devonian series, the folds becoming rapidly more compressed and the disturbances greater as we advanced into the mountains. At Slatoust we encountered the first crystalline schists, considered by Tschernyscheff our leader, on stratigraphic evidence which but few of the party considered conclusive, to be metamorphic Devonian.

Within this band of schists or on its borders, is a group of mineral localities which have produced many interesting and beautiful specimens obtained by the efforts of many engineers of the Russian Mining Bureau through a long series of years, and now in large part preserved in the cabinet of the Mining Academy in St. Petersburg. These minerals all appear to be contact products between clay slates and limestones and massive eruptive rocks of the character of diorite or peridotite. One of the best known and most typical of these occurrences is the Achmatoff mine. Here, on a more or less chloritic matrix, were found beautiful crystallizations of garnet, epidote, pyroxene, vesuvianite, such titamium minerals as perofskite, titanite and ilmenite, zircon, apatite and various members of the chlorite group.

Passing eastward still across the Ural divide, we entered a region of gneisses and granitic rocks. The day spent at Miass, in the Ilmen Mountains, under the joint leadership of Karpinsky and Arzruni, was replete with interest. The Ilmen Mountains are a subordinate range of the Ural chain composed largely of eleolite-syenite, classical under Gustav Rose's name of *miascite*. This rock is well exposed, is rich in a variety of minerals and offers numerous interesting problems to the petrographer. The most notable minerals here collected, chiefly from the pegmatitic facies of the rock, were nepheline, cancrinite and sodalite, zircon, apatite, ilmenite and biotite in huge plates. In the pegmatite veins traversing the neighboring gneiss and granite, we saw a very different group of minerals including albite and microcline, topaz, zircon and euclase and samarskite, pyrochlor and other rare earth minerals.

At Miass, also, was the first of the gold placers which are worked, by what seemed crude and primitive methods, in various parts of the Urals.

At Tcheliabinsk, the eastern limit of our excursion, as well as at Beresof, near Ekaterinburg, we saw gold-bearing quartz veins, the former only recently explored, the latter with extensive workings dating back many years.

At Ekaterinburg, the principal city of the Ural region, we we were hospitably entertained by the Ural Society for Natural Science, and were shown an interesting exhibit of the products of numerous local establishments for the cutting of gems and semi-precious stones.

Continuing northward our next halt was in the busy mining town of Njni-Taghilsk. Within this district are the extensive iron mines (magnetite) of Wyssokaia and Blagodat; the copper mine of Mednoroudiansk, famous for its former production of the malachite so prized in Russian decoration; largely worked deposits of manganese ore, and the platinum placers at Platina. This last metal appears to occur in the peridotitic rocks which constitute the bed rock of the region; their decomposition sets it free, so that it may be won by placer washing.

Again crossing the water-shed of the Urals and descending rapidly to the plain we reached Perm on the Kama River, where we left our train for a roomy and comfortable steamer on which for three days we floated down the stream to its confluence with the Volga. Numerous excursions on the banks made us acquainted with the Permian series, including the upper, Permo-triassic division, the so-called "etage tartarien." Turning up the Volga we halted at the old tartar city of Kazan, where we were entertained by the university and later by the city. And the end of the fourth day from Perm found us at Njni-Novgorod. A day was spent here seeing the fair, and then we took train directly for St. Petersburg, where we found the quarters previously assigned us in the many hotels of the city or in the large dormitory of the university, where some fifty of the members were located. The hundred and twenty members of the Finland excursion reached St. Peters-

burg the same morning (August 28th) by steamer, reporting a most interesting week's trip, during which they had enjoyed quite as lavish hospitality as had been the lot of those in the Urals. They were under the guidance of Sederholm, and saw much glacial geology in addition to the old crystalline formations of western and southern Finland.

The formal opening of the Congress took place the afternoon of Sunday, August 29th, in the hall of the Zoological Institute of the University, which was well filled by a large and brilliant audience. The Honorary President of the Congress, the Grand Duke Constantine Constantinovitch, presided and opened the session with an address of welcome. It was followed by similar addresses by the Princess of Oldenburg, President of the Imperial Society of Mineralogy, and by the Minister of Agriculture, Ermoloff. Renevier, President of the preceding Congress, announced the officers named by the council, the American Vice-Presidents being Marsh, Emerson, Emmons and Frazer. The address of the President, Karpinsky, was chiefly occupied with a brief statement of the questions to come before the Congress, and after a resumé by Tschernyscheff, Secretary-General, of the work of the Committee of Organization in arranging for the Congress and excursions, the session came to a close.

Of the eight hundred and fifty names which appeared in the official list of the members of the Congress, upwards of six hundred were recorded as in attendance. Despite this very large membership the actual number at the meetings was very small, rarely more than one hundred being present. But the adjoining hall where numerous exhibits were arranged was always occupied by a throng of members, showing very clearly that here as generally in such meetings, it is the personal intercourse that is desired by the members rather than the formal discussions.

The subjects which it was desired to have specially brought before this Congress, as announced in an early circular of the Committee of Organization and as stated in the President's address, were as follows:

1. Shall stratigraphic nomenclature be based upon an artificial or upon a natural classification.

2. Establishment of rules governing introduction of new terms in stratigraphic nomenclature.

3. Adoption of definite principles of classification of rocks and of petrographic nomenclature.

The discussion of the first question showed clearly the opinion of most of the geologists present that the accepted artificial classification was the only admissable one, its abandonment for what must necessarily as yet be a somewhat vague and ill-defined substitute, being certain to result only in a state of confusion in the science.

Discussion of the second proposition centered upon papers presented at an early meeting by Frech, Breslau, Ueber Abgrenzung und Benennung der geologischen Schichtengruppen, and by Bittner, Vienna, Vorschläge für eine Normiring der Reglen der stratigraphischen Nomenclatur.

The propositions of these writers as modified and accepted by the Congress amounted to little more than a formal statement of the ordinary practice of geologists with regard to new names. They were in brief as follows:

1. Introduction of a new stratigraphic term into the international nomenclature, should be based only on a well determined and peremptory scientific necessity, should be accompanied by full description of deposits to which it is applied, and should be founded on facts observed on more than a single exposure.

2. A name applied to any deposit in a definite way is not to be used in another sense.

3. Date of publication determines priority of terms.

4. In giving new names to minuter stratigraphic subdivisions, it is desirable to take paleontological characteristics as a base. Geographic names should only be used in default of the former, or for series of importance containing numerous paleontological horizons.

5. Names etymologically false or badly formed are to be rejected or corrected.

One afternoon meeting was devoted to subjects of petrographic character, and in order to facilitate discussion of the general questions in that department, a special meeting of pet-

rographers, to the number of over fifty, was held, Zirkel presiding. The discussions were animated, centering upon classification, but resulted in the following almost unanimous expression of opinion, which was presented through the council to the Congress:

"It is not desirable, in view of the present rapid development of the science of petrography, to attempt to establish definite principles of classification of rocks by a resolution of the Congress.

"To attain the simplification of petrographic nomenclature demanded by geologists, it is necessary to define with greater precision than has yet been done such general terms as are required in geological mapping."

A resolution presented by Brögger expressed the view that it was desirable and probably practical to establish a international journal of petrography devoted chiefly to reviews and abstracts of the current literature. This resolution excited considerable debate, but was finally adopted and transmitted to the Congress with the request that a committee be appointed to ascertain the feasibility of the plan. The committee named consists of fifteen men, the American members being Iddings and Pirsson.

Papers of interest presented in this department were by Walter, Jena, Versuch einer Classification der Gesteine auf Grund der vergleichenden Lithogenie, and by Loewinson-Lessing, Dorpat, Note sur la Classification et la Nomenclature des Roches Eruptives.

Walter attempts a general classification, his basis being the recognition of primary and of secondary characters in rocks, of which the first alone determines the place in the system. Thus every metamorphic rock, however altered by "secondary characters," is grouped under the rock from which it is derived. He makes four main groups, Mechanical, Chemical, Organic and Volcanic Rocks.

Loewinson-Lessing bases his classification of the eruptive rocks wholly on their chemical composition, expressed in terms of the "oxygen equivalent," and of the proportions of the various oxides.

The Congress endorsed strongly a proposition by Androussoff, Dorpat, for the establishment of an International Floating Institute, or laboratory, for the study of Oceanography, to be supported by various Governments in place of the isolated expeditions sent out for this purpose from time to time by different ones.

The invitation of the French geologists to hold the next session of the Congress in Paris in 1900 was accepted. A bulletin was distributed showing the proposed excursions to Brittany, to Normandy, and, after the session, to the Central Plateau and the French Alps.

A sad incident of the Congress was the sudden death in St. Petersburg of one of its members, Spendiaroff, Dorpat, who had taken part in the Ural excursion and was to have been a leader during a part of the Caucasus excursion. At the closing session of the Congress it was announced that the father of the deceased had presented a sum of money to commemorate his son, the interest to be awarded as a prize for the best paper on a stated subject at successive meetings of the Congress.

Numerous festivities and excursions were a part of the week's program at St. Petersburg. The Tsar received in audience at his palace of Peterhof, a small number of the more distinguished representatives of each country. At a later day, but in his absence, the whole Congress visited the palace and beautiful grounds, journeying down the harbor by steamer and enjoying a luncheon in the magnificient imperial dining hall.

Another day was devoted to a visit to the cataract of Imatra in Finland, a hundred miles north of St. Petersburg, where a sumptuous banquet was served in a pavilion erected for the purpose on the edge of the thundering torrent.

Among the entertainments in St. Petersburg, the most notable were the reception by the Grand Duke Constantine at his palace and that by the Mayor and city officials at the City Hall. Many pleasant reunions took place at the German Club which was placed at the disposal of the members during the session. The museums and collections of the city were made easy of access through special open hours, and their manifold

attractions doubtless were to blame for the frequently slim attendance at the meetings.

The close of the session was marked by the departure of a large proportion of the members for Moscow, the starting point of the three excursions which journeyed by different routes toward the Caucasus and the Crimea. Upward of four hundred people participated in these excursions which promised so many and so varied interests.

SOME UNWRITTEN HISTORY OF THE NAPLES ZOOLOGICAL STATION.

All American biologists are familiar with the Zoological Station at Naples, either through having enjoyed its unrivalled facilities or from accounts of it which have been published again and again in the journals, both scientific and popular, of the two worlds. It is, beyond question, the greatest establishment for research in the world. But while it occupies this position to-day, and while its history since it first threw its doors open to the investigator is a part of the history of biology, the station has an unwritten history which is extremely interesting, especially since it shows, in strongest light, the indefatigable industry and resourcefulness of its founder and director, Dr. Anton Dohrn, in overcoming obstacles of every sort, many of which would have discouraged a man of less persistence. On the evening of August 10, 1897, Dr. Dohrn told the students at the Marine Biological Laboratory at Woods Holl, some of the difficulties which he encountered before the station was ready for students. His talk is summarized in the following account, his own words being used in some cases.

After apologies for possible linguistic mistakes due to the use of a foreign tongue and for the prominence of himself in what he had to say, Dr. Dohrn continued by asking his audience to imagine a young privat-docent of the University of Jena, with rather more money than he well knew how to spend; with more time than he knew how to use, but with a